

COMPLETE LISTING OF THE CLAIMS

The following lists all of the claims that are or were in the above-identified patent application.

1. (Currently Amended) A packaged device comprising:
a substrate having conductive traces on a first face and a ball grid array on a second face that is opposite the first face;
a die having metal bumps formed on a first major surface of the die, the die being placed so that the metal bumps contact the conductive traces on the first face of the substrate, wherein an edge of the die overlies a portion of the ball grid array;
a dam surrounding the die on the first face of the substrate; and
a ~~fill~~ underfill material filling of a gap between the die and the substrate and extending from under the die onto the first face of the substrate, wherein the underfill material remains at a level below a second major surface of the die, and the dam confines and shapes ~~an edge of the fill~~ underfill material at an edge that overlies a portion of the ball grid array.
2. (Currently Amended) The device of claim 1, wherein the ~~fill~~ underfill material when liquid has a wetting angle at the die that is less than 45° down from a top surface of the dam.
3. (Canceled)
4. (Currently Amended) The device of claim 1, ~~further comprising a ball grid array on a side of the substrate opposite to the die,~~ wherein the ball grid array ~~having~~ has a pitch that is less than or about equal to one half a separation between the dam and an edge of the die.
5. (Original) The device of claim 4, wherein the dam has a width that is between one and two times the pitch of the ball grid array.
6. (Original) The device of claim 1, wherein the dam comprises a structure attached to the substrate.

7. (Original) The device of claim 1, wherein the die resides inside a depression in the substrate, and the dam comprises a portion of the substrate surrounding the depression.

8. (Currently Amended) ~~The~~ A packaged device of claim 1 comprising:
a substrate having conductive traces on a first face and a ball grid array on a second face that is opposite the first face;
a die having metal bumps formed on a major surface of the die, the die being placed so that the metal bumps contact the conductive traces on the first face of the substrate, wherein an edge of the die overlies a portion of the ball grid array;
a dam surrounding the die on the first face of the substrate; and
a fill material filling of a gap between the die and the substrate and extending from under the die onto the first face of the substrate, wherein the dam confines and shapes an edge of the fill material that overlies a portion of the ball grid array, wherein:
the dam comprises a bead of the fill material; and
the substrate comprises a treated region on which the bead, the treated region such that the fill material when liquid has a higher affinity for the treated region than for an adjacent region of the substrate so that the treated region confines and shapes the fill material when the fill material is liquid.

9. (Original) The device of claim 8, wherein the treated region of the substrate comprises a region of material on the substrate.

10. (Original) The device of claim 9, wherein the material of the treated region comprises a substance selected from the group consisting of polymers, metals, ceramics, and combination thereof.

11. (Original) The device of claim 8, wherein the treated of the substrate comprises a roughened portion of the substrate.

12. (Original) The device of claim 8, wherein the treated regions is such that beading of the fill material on the treated region prevents formation of thin fillet regions of the fill material.

13. (Original) A packaged device comprising:
a substrate including conductive traces and a treated region;
a die having contacts formed on a major surface of the die, the die being placed so that the contacts electrically connect to the conductive traces of the substrate; and
a fill material filling of a gap between the die and the substrate and forming a bead on the treated regions, wherein the treated region is such that the fill material when liquid has a higher affinity for the treated region than for an adjacent region of the substrate so that the treated region confines the fill material when liquid and shapes the bead.

14. (Original) The device of claim 13, wherein the treated region of the substrate comprises a region of a material on the first portion of the substrate.

15. (Original) The device of claim 14, wherein the material comprises a substance selected from the group consisting of polymers, metals, ceramics, and combination thereof.

16. (Original) The device of claim 13, wherein the treated of the substrate comprises a roughened portion of the substrate.

17. (Original) The device of claim 13, wherein the treated regions is such that beading of the fill material on the treated region prevents formation of thin fillet regions of the fill material.